$$\int (x^2 + e^x)\,dx$$

$$\frac{d}{dx} uv = u\frac{dv}{dx} + v\frac{du}{dx}$$

$$-v\frac{du}{dx} \qquad -v\frac{du}{dx}$$

$$\int x^2 e^x\,dx$$

$$u\frac{dv}{dx} = \frac{d}{dx}uv - v\frac{du}{dx}$$

$$\int u\frac{dv}{dx}\,dx = \int \frac{d}{dx}uv\,dx - \int v\frac{du}{dx}\,dx$$

$$\boxed{\int u\,dv = uv - \int v\,du}$$

$$\int x\cos x\,dx \qquad u = x \quad du = 1 \quad dv = \cos x \quad v = \sin x$$

$$\int x\cos x\,dx = x\sin x - \int \sin x\,dx$$

$$= x\sin x - -\cos x + C$$

$$\boxed{= x\sin x + \cos x + C}$$

$$\int u\,dv = uv - \int v\,du$$

$$\int x^2 e^x\,dx \qquad u = x^2 \quad du = 2x \quad dv = e^x \quad v = e^x$$

$$\int x^2 e^x\,dx = x^2 e^x - 2\int x e^x\,dx \qquad u = x \quad du = 1 \quad dv = e^x \quad v = e^x$$

$$= x^2 e^x - 2\left[x e^x - \int e^x\,dx\right]$$

$$\boxed{= x^2 e^x - 2xe^x + 2e^x + C}$$

$$\int u\,dv = uv - \int v\,du$$

$$\int x \ln x \, dx \qquad u = \ln x \quad du = \frac{1}{x} \qquad dv = x \quad v = \frac{x^2}{2}$$

$$= \ln x \cdot \frac{x^2}{2} - \int \frac{x^{\cancel{2}}}{2} \cdot \frac{1}{\cancel{x}}\,dx$$

$$= \frac{x^2 \ln x}{2} - \frac{x^2}{4} + C$$

$$\frac{dy}{dx} = x \sin x$$

6.3 #2 - 16 (even)

HW #1 - 15 (odd)